Amendments to the Claims

Amend claims 1-16, 18-20, 22-25, 28, 30, 32-43 and 45.

The following listing of claims will replace all prior versions and listings of claims in the application. With this preliminary amendment, subparagraphs are now identified with lower case letters.

1. (currently amended) ~~A guidewire protection apparatus~~ Apparatus for use in vascular procedures comprising:

a. a tubular guidewire having a proximal end, a distal end, and a lumen;

b. a control cable having a proximal end and a distal end disposed in the lumen of the tubular guidewire; and,

c. a sheathless filter distally coupled to the control cable and proximally coupled to the tubular guidewire, the sheathless filter being radially ~~expanding~~ expandable in response to displacement of the control cable relative to the tubular guidewire such that the sheathless filter presents at least a convex primary filter surface to a flow of blood within a blood vessel ~~into which the guidewire has been~~ when introduced thereinto and expanded.

2. (currently amended) The apparatus of claim 1, further including means for resisting displacement of the control cable relative to the tubular guidewire ~~proximate the proximal end of the guidewire~~.

3. (currently amended) The apparatus of claim 2, wherein the means for resisting displacement comprises ~~an intermediate shaft~~ a short tube disposed ~~between~~ intermediate the tubular guidewire and the control cable, the ~~intermediate shaft~~ short tube being crimpable to selectively resist movement of the control cable and maintain a position of the control cable relative to the tubular guidewire.

4. (currently amended) The apparatus of claim 2, wherein the means for resisting displacement comprises a clamping mechanism to selectively clamp the control cable ~~along the guidewire~~ to resist movement of the control cable and to maintain a position of the control cable relative to the tubular guidewire.

5. (currently amended) The apparatus of claim 2, wherein the means for resisting displacement comprises a stop that limits displacement of the control cable relative to the tubular guidewire, the stop being disposed between the distal and proximal ~~end~~ ends of the sheathless filter.

6. (currently amended) The apparatus of claim 1, wherein the sheathless filter comprises:

a. a tubular braided wire ~~mesh~~ framework; and,

b. multifilament polymer fibers[[,]] ~~wherein the wire mesh forms a tubular braided framework on which the fibers are~~ woven onto the tubular braided wire framework ~~to create the sheathless filter~~.

7. (currently amended) The apparatus of claim 6, wherein the tubular braided wire ~~mesh~~ framework is constructed of [[a]] biocompatible wire.

8. (currently amended) The apparatus of claim 7, wherein the biocompatible wire ~~mesh~~ is ~~constructed of a Nitinol~~ nitinol wire.

9. (currently amended) The apparatus of claim 6, wherein the multifilament polymer fibers are woven into a fabric that is then attached to the tubular braided wire ~~mesh~~ framework.

10. (currently amended) The apparatus of claim 6, wherein a distal end of the tubular braided wire ~~mesh~~ framework is operably attached to the control cable and a proximal end of the tubular braided wire framework is operably attached ~~of the wire mesh~~ to the tubular guidewire.

11. (currently amended) The apparatus of claim 6, wherein the tubular braided wire ~~mesh~~ framework and the multifilament polymer fibers are spaced with respect to each other so as to define a maximum pore size of 0.010 ~~inches~~ inch that will effectively capture particles greater than ~~100~~ 250 microns in diameter.

12. (currently amended) The apparatus of claim 1, wherein the sheathless filter includes means for visibly identifying the sheathless filter under fluoroscopy.

13. (currently amended) The apparatus of claim 1, wherein the sheathless filter includes a distal interior face presenting a ~~secondary~~[[,]] concave secondary filter surface to the flow of blood within the blood vessel ~~into which the guidewire has been introduced~~.

14. (currently amended) The apparatus of claim 1, wherein the proximal end of the tubular guidewire ~~assembly~~ is free of mechanical connections and obstructions ~~and functions~~ so as to enable the tubular guidewire to function as a conventional exchange guidewire while the sheathless filter is deployed.

15. (currently amended) The apparatus of claim 1, wherein the ~~guidewire~~ sheathless filter has an outer diameter of ~~less than 0.046 inches~~ a maximum of 0.038 inch.

16. (currently amended) The apparatus of claim 1, wherein the sheathless filter is formed of resilient flexible members interlaced to form a tubular net, the tubular net having [[a]] an undeployed state in which the flexible members lie generally parallel to a longitudinal axis of the control cable and tubular guidewire and having a plurality of selectively deployable states in which the flexible members are radially expanded from the longitudinal axis of the control cable and tubular guidewire to a diameter coincident with a diameter of the blood vessel ~~into which the guidewire had been introduced~~.

17. (original) The apparatus of claim 16, wherein the plurality of selectively deployable states include a state in which the flexible members are radially expanded and effectively abut each other such that blood is unable to pass through the sheathless filter.

18. (currently amended) The apparatus of claim 16, wherein the plurality of selectively deployable states include a state in which the flexible members define a pore size between adjacent members that is ~~less than 0.010 inches~~ a maximum of 0.010 inch so as to filter particles greater than ~~200~~ 250 microns.

19. (currently amended) A method of protecting against plaque, thrombus or grumous material flowing downstream during a vascular procedure, the method comprising:

a. guiding a tubular guidewire into a blood vessel and positioning a ~~protective~~ sheathless filter proximate a distal end of the tubular guidewire distal to a region of [[a]] the blood vessel to be treated;

b. displacing a control cable coaxially disposed with the tubular guidewire to cause expansion of the ~~protective~~ sheathless filter to span a diameter of the blood vessel and present at least a convex surface to a flow of blood within the blood vessel;

c. selectively securing the control cable relative to the tubular guidewire to maintain a position of the ~~protective~~ sheathless filter during the vascular procedure;

d. performing the vascular procedure;

e. introducing a thrombectomy catheter over a proximal end of the tubular guidewire and advancing the thrombectomy catheter to the region of the blood vessel to be treated;

f. removing plaque, thrombus or grumous material captured by the ~~protective~~ sheathless filter during the vascular procedure via the thrombectomy catheter;

g. releasing the control cable relative to the tubular guidewire and causing the ~~protective~~ sheathless filter to contract; and,

h. withdrawing the tubular guidewire ~~out of~~ from the blood vessel.

20. (currently amended) The method of claim 19, wherein the vascular procedure comprises an asymmetric water jet ~~atheroectomy~~ atherectomy.

21. (original) The method of claim 19, wherein the vascular procedure comprises an asymmetric water jet thrombectomy.

22. (currently amended) The method of claim 19, wherein the step of removing material ~~utilizes~~ involves utilizing a water jet that directs a working fluid at a velocity sufficient to generate a stagnation pressure large enough for removal of the material.

23. (currently amended) The method of claim 19, wherein the step of removing material ~~utilizes~~ involves utilizing aspiration to remove the material.

24. (currently amended) A system for filtering and removing plaque, thrombus or grumous material coincident with a vascular procedure comprising:

a. a guidewire having a sheathless filter positioned proximate a distal end of the guidewire, the sheathless filter being selectively deployable such that the sheathless filter presents at least a convex filter surface to a flow of blood within a blood vessel ~~into which the guidewire has been~~ when introduced into the blood vessel and deployed prior to the vascular procedure;

b. an evacuation catheter having an evacuation lumen to be tracked over the guidewire and at least one evacuation opening proximate a distal end of the evacuation lumen; and,

c. means for removing plaque, thrombus or grumous material captured by the sheathless filter during the vascular procedure via the evacuation lumen of the evacuation catheter prior to the sheathless filter being selectively undeployed and the guidewire removed from the vessel.

25. (currently amended) The system of claim 24, further comprising:

a. a therapeutic catheter having a fluid lumen and trackable over the guidewire as part of the vascular procedure, the fluid lumen including at least one orifice proximate a distal end and opening to a side of the therapeutic catheter; and,

b. means for supplying a working fluid under high pressure to the fluid lumen of the therapeutic catheter such that the working fluid is directed from the at least one orifice as a fluid jet stream longitudinally impacting on a deposit in the blood vessel to erode the deposit and generate free floating plaque, thrombus or grumous material in the blood vessel proximal to the sheathless filter.

26. (original) The system of claim 25, wherein the therapeutic catheter and the evacuation catheter comprise a single catheter.

27. (original) The system of claim 26, wherein the therapeutic catheter includes a plurality of orifices and the corresponding plurality of fluid jet streams create a localized low pressure region that draws plaque, thrombus or grumous material into the evacuation lumen.

28. (currently amended) The system of claim [[23]] 24, wherein the guidewire has a proximal end, a distal end, and a lumen and further comprises a control cable having a proximal end and a distal end disposed in the lumen of the guidewire, wherein the sheathless filter is distally coupled to the control cable and proximally coupled to the guidewire.

29. (original) The system of claim 28, further including means for resisting displacement of the control cable relative to the guidewire proximate the proximal end of the guidewire.

30. (currently amended) The system of claim 29, wherein the means for resisting displacement comprises ~~an intermediate shaft~~ a short tube disposed ~~between~~ intermediate the guidewire and the control cable, the ~~intermediate shaft~~ short tube being crimpable to selectively resist movement of the control cable and maintain a position of the control cable relative to the guidewire.

31. (original) The system of claim 29, wherein the means for resisting displacement comprises a clamping mechanism to selectively clamp the control cable along the guidewire to resist movement of the control cable and maintain a position of the control cable relative to the guidewire.

32. (currently amended) The system of claim 29, wherein the means for resisting displacement comprises a stop that limits displacement of the control cable relative to the guidewire, the stop being disposed between the distal and proximal ~~end~~ ends of the sheathless filter.

33. (currently amended) The system of claim 23, wherein the sheathless filter comprises:

a. a tubular braided wire ~~mesh~~ framework; and,

b. multifilament polymer fibers[[,]] ~~wherein the wire mesh forms a tubular braided framework on which the fibers are~~ woven onto the tubular braided wire framework ~~to create the sheathless filter~~.

34. (currently amended) The system of claim 33, wherein the tubular braided wire ~~mesh~~ framework is constructed of [[a]] biocompatible wire.

35. (currently amended) The system of claim 34, wherein the biocompatible wire ~~mesh~~ is ~~constructed of a Nitinol~~ nitinol wire.

36. (currently amended) The system of claim 33, wherein the multifilament polymer fibers are woven into a fabric that is then attached to the tubular braided wire ~~mesh~~ framework.

37. (currently amended) The system of claim 33, wherein a distal end of the tubular braided wire ~~mesh~~ framework is operably attached to the control cable and a proximal end of the tubular braided wire framework is operably attached ~~of the wire mesh~~ to the guidewire.

38. (currently amended) The system of claim 33, wherein the tubular braided wire ~~mesh~~ framework and the multifilament polymer fibers are spaced with respect to each other so as to define a maximum pore size of 0.010 ~~inches~~ inch that will effectively capture particles greater than ~~200~~ 250 microns in diameter.

39. (currently amended) The system of claim [[23]] 24, wherein the sheathless filter includes means for visibly identifying the sheathless filter under fluoroscopy.

40. (currently amended) The system of claim [[23]] 24, wherein the sheathless filter includes a distal interior face presenting a ~~secondary~~[[,]] concave secondary filter surface to the flow of blood within the blood vessel ~~into which the guidewire has been introduced~~.

41. (currently amended) The system of claim [[23]] 24, wherein the proximal end of the guidewire ~~assembly~~ is free of mechanical connections and obstructions ~~and functions~~ so as to enable the guidewire to function as a conventional exchange guidewire while the sheathless filter is deployed.

42. (currently amended) The system of claim [[23]] 24, wherein the ~~guidewire~~ sheathless filter has an outer diameter of ~~less than 0.046 inches~~ a maximum of 0.038 inch.

43. (currently amended) The system of claim [[23]] 24, wherein the sheathless filter is formed of resilient flexible members interlaced to form a tubular net, the tubular net having [[a]] an undeployed state in which the flexible members lie generally parallel to a longitudinal axis of the control cable and guidewire and having a plurality of selectively deployable states in which the flexible members are radially expanded from the longitudinal axis of the control cable and guidewire to a diameter coincident with a diameter of the blood vessel ~~into which the guidewire had been introduced~~.

44. (original) The system of claim 43, wherein the plurality of selectively deployable states include a state in which the flexible members are radially expanded and effectively abut each other such that blood is unable to pass through the sheathless filter.

45. (currently amended) The system of claim 43, wherein the plurality of selectively deployable states include a state in which the flexible members define a pore size between adjacent members that is ~~less than 0.010 inches~~ a maximum of 0.010 inch so as to filter particles greater than ~~200~~ 250 microns.